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Arabica Coffee in Mixed Cropping Systems – A Contribution to Sustainable Highland Agriculture and Food Safety

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Abstract

Highland areas are fragile ecosystems and in northern Thailand, livelihoods of highland farmers depend on the sustainable use of natural resources. Arabica coffee (*Coffea arabica*) was introduced by the Royal Project Foundation (RPF) to improve farmers' incomes and at the same time, introduce mixed cropping systems that are better adapted for the highland agro-ecosystems.

Focusing on the observation of plant growth, leaf rust incidence, yield and good cupping, 14 varieties from different RPF planting sites were collected and planted at the RPF Inthanon Research Station, Chiang Mai, Northern Thailand. Five sampling varieties namely A3, A4, A5, A6 and A8 showed tolerance against leaf rust and were rated highest in terms of cupping, scoring 80–82 points according to the SCAA standard. Propagating these varieties will create a sturdy base for low pesticide coffee production.

To improve quality and yield, at the RPF Development Centers Pamiang and Teen Tok, Chiang Mai, coffee plants were grown under shade trees and hard pruning was applied. This system was compared to farmers' practice. Results show that pruned trees yielded an average of 3.2–4.5 $kg\,tree^{-1}$ of fresh beans, which is significantly higher than yields of farmer plots.

Sustainability aspects of coffee production were studied at Wawee RPF Extension Area, Chiang Rai. The objective was to demonstrate RPF knowledge on improving quality and yield of coffee by integrated farm management for soil and water conservation. Shade was created by intercropping with banana, Fraxinus (*Fraxinus griffithii*), Indian Gooseberry (*Phyllanthus emblica L.*) and Macadamia nut. Two years experiment show that coffee trees trend to have significantly higher fruiting as compared to conventional farmers' practice. Shade trees offer additional products and contribute to restore and conserve soil fertility and water holding capacity. In addition, insect pests and diseases decreased by up to 15 %, whereby farmers can reduce the use of agro-chemicals considerably. Thus, farmers collaborating with the RPF are able to achieve high yields at good quality, without chemical residues.

Keywords: Coffee, Royal Project Foundation, rural livelihoods, Thailand

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